WORKSHOP PRACTICE

Manufacturing of Hand Injection Mould

सत्यमेव जयते
MINISTRY OF MICRO, SMALL & MEDIUM ENTERPRISES
GOVERNMENT OF INDIA

CTTC
BHUBANESWAR

As 9100
ISO-9001,14001
OHSAS-18001, ISO-29990

CENTRAL TOOL ROOM & TRAINING CENTRE
Bhubaneswar

NSQF Complied Long Term Courses

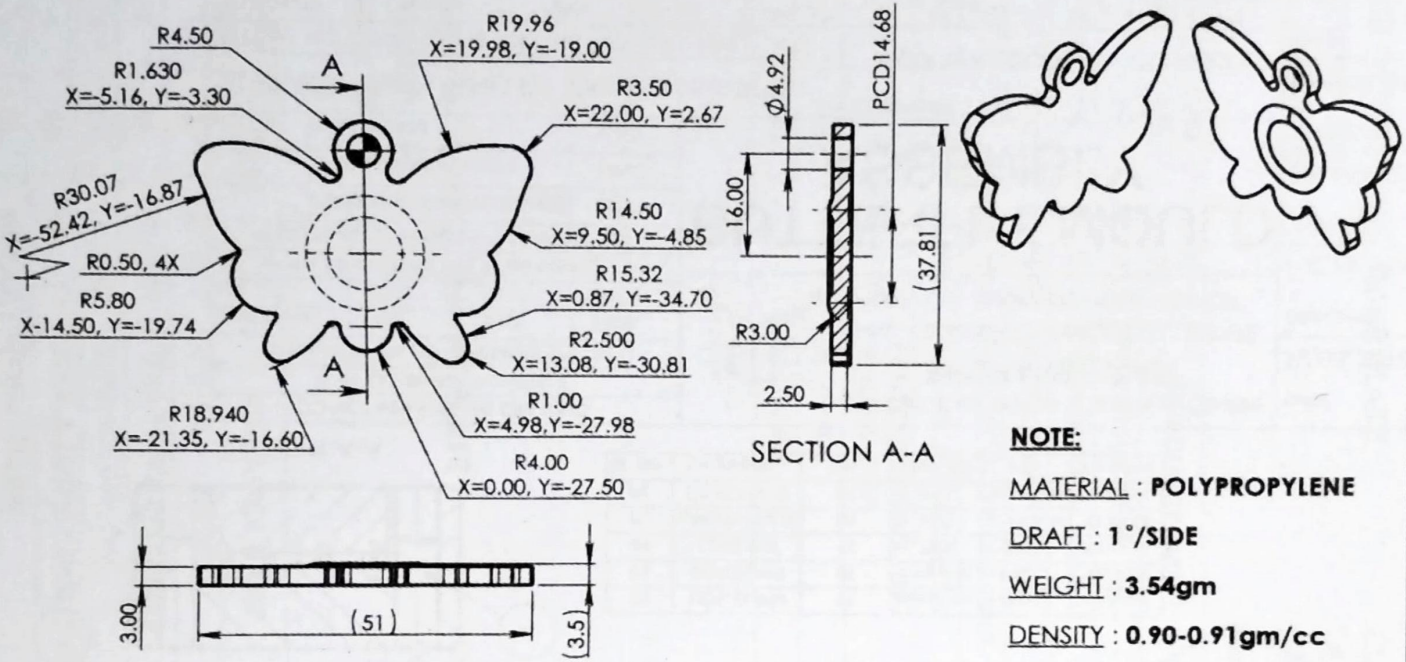
NSQF COMPLIED LONG TERM COURSES

COURSE NAME		DURATION	COURSE FEE
COURSES FOR 10TH PASS OUT			
Diploma in Tool & Die Making	DTDM	4 Year	₹. 38,000/-(per Year)
Diploma in Mechantronics	DIM	3 Year	₹. 38,000/-(per Year)
ITI Machinist	ITIM	2 Year	₹. 28,000/- (per Year)
ITI Fitter (Course at Kalinga Nagar Extention Centre)	ITIF	2 Year	₹. 28,000/- (per Year)
ITI Electrician (Course at Kalinga Nagar Extention Centre)	ITIE	2 Year	₹. 28,000/- (per Year)
Condensed Course in Tool & Die Making	CTDM	1 Year	₹. 66,000/-
Certificate Course in CNC Turning & Milling	CCTM	1 Year	₹. 32,000/-
COURSES FOR UNDER MATRIC			
Certificate Course in Machine Operation	CCMO	1 Year	₹. 18,000/-
COURSES FOR ITI STUDENTS			
Certificate Course in Advance Machining	CCAM	1 Year	₹. 32,000/-
Advance Certificate Course in Machine Maintenance	ACCMM	1 Year	₹. 32,000/-
Advance Certificate Course in CNC Machining	ACCCM	1 Year	₹. 34,000/-
Advance Certificate Course in Welding Technology	ACCWT	1 Year	₹. 50,000/-
Certificate Course in Machining	CCM	6 Months	₹. 22,000/-
Certificate Course in Fitting & Rigging	CCFR	6 Months	₹. 32,000/-
COURSES FOR DIPLOMA IN MECHANICAL ENGG. OR EQUIVALENT			
Post Diploma in Tool & Die Making	PDTDM	1 Year	₹. 54,000/-
Post Diploma in CAD/CAM	PDCC	1 Year	₹. 54,000/-
Master Certificate Course in Tool Design	MCCTD	6 Months	₹. 34,000/-
Advance Diploma in CNC Programming Techniques & Practice	ADCNC	6 Months	₹. 34,000/-
COURSES FOR DEGREE IN MECHANICAL ENGG. OR EQUIVALENT			
Post Graduate Diploma in Tool Design & CAD/ CAM	PGDTD	1 Year	₹. 60,000/-
Post Graduate in Aerospace Manufacturing	PGAM	1 Year	₹. 60,000/-
Master Certificate course in CAD / CAM	MCC	6 Months	₹. 36,000/-
COURSES FOR DIPLOMA IN ELECTRICAL/ELECTRONICS ENGG. OR EQUIVALENT			
Advanced Diploma in Machine Maintenance & Automation	ADMMA	6 Months	₹. 34,000/-
Advanced Embedded Technology	AET	6 Months	₹. 34,000/-
Certificate Course in Electrical Equipment Repair & Maintenance	CCERM	6 Months	₹. 34,000/-
Post Diploma in Industrial Automation & Robotics	PDIAR	1 Year	₹. 60,000/-
COURSES FOR DEGREE IN ELECTRICAL/ELECTRONICS ENGG. OR EQUIVALENT			
Master Certificate Course in Automation & Process Control	MCCAPC	6 Months	₹. 36,000/-
COURSES FOR DIPLOMA IN MECHANICAL/ ELECTRICAL/ELECTRONICS ENGG. OR EQUIVALENT			
Post Diploma In Mechatronics	PDIM	1 Year	₹. 54,000/-
Master Certificate Course in Mechatronics	MCCM	6 Months	₹. 34,000/-
COURSES FOR DIPLOMA/DEGREE IN CIVIL ENGG.			
Post Diploma in Structural Analysis & Project Management	PDSPM	1 Year	₹. 54,000/-
Advance Diploma in Structural Design & Analysis	ADSDA	6 Months	₹. 34,000/-
COURSES FOR ANY GRADUATE			
Advance Certificate Course in Inspection & Quality Control	ACCIQ	6 Months	₹. 22,000/-
Advance Diploma in Computer Hardware & Networking Management	ADCHNM	6 Months	₹. 34,000/-
Advanced Certificate Course in Software Application	ACCSA	6 Months	₹. 22,000/-

** Assessment Fee of ₹. 500 will be charged excluding the course fee for course having duration more than 1 month and ₹. 800/- for course duration of 1 year and above

For Admission Contact : 9853335940/9437988052/9853248258/9438504038

FOR STARTING DATE OF RESPECTIVE COURSES; FOLLOW LAST PAGE



NOTE:

MATERIAL : **POLYPROPYLENE**

DRAFT : **1°/SIDE**

WEIGHT : **3.54gm**

DENSITY : **0.90-0.91gm/cc**

DO NOT MEASURE THE DRAWING			
IF IN DOUBT ASK POSITIVELY			
TOLERANCES UNLESS OTHERWISE SPECIFIED			
ANGULAR	X.0	X.00	X.000
±0.30°	±0.25	±0.10	±0.01
ALL DIMENSIONS ARE IN MILIMETRE			
REMOVE ALL UNNECESSARY SHARP EDGES			
⊥	PERPENDICULARITY(SQUARE)		±0.01
◎	CONCENTRICITY LIMITS		±0.01
//	PARALLELISM		±0.01

SURFACE FINISH AND Ra VALUE IN MICRON

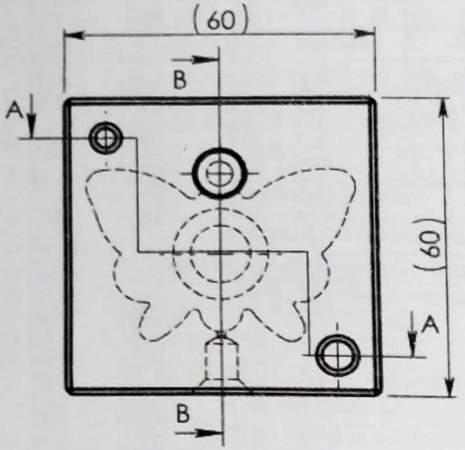
N1 N2 N3	N4 N5 N6	N7 N8 N9	N10 N11	N12
0.025 0.05 0.1	0.2 0.4 0.8	1.6 3.2 6.4	12.5 25	50

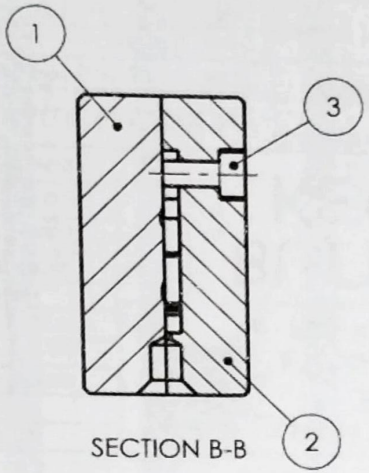
CENTRAL TOOL ROOM & TRAINING CENTRE
BHUBANESWAR
B-36, CHANDAKA INDUSTRIAL ESTATE
POST- KIIT, BHUBANESWAR- 751 024

BUTTERFLY KEY RING

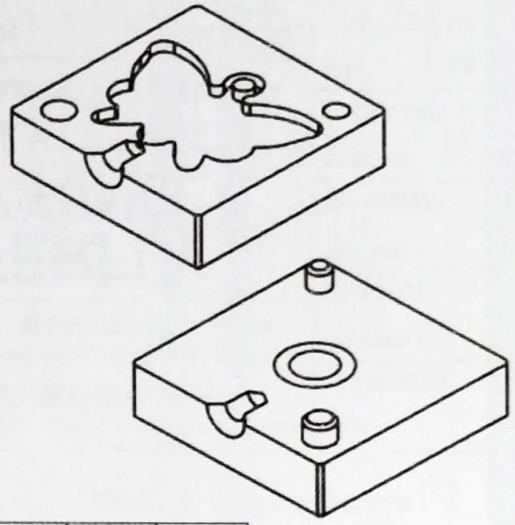
COMPONENT NO.	XXXXXXXXXXXX
O.C. NO.	XXXXXXXX
SCALE:	NTS

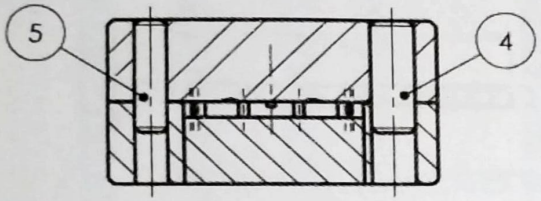
DATE	12.05.2018
DESIGNED	J.R.MUDULI
CHECKED	S.N.MISHRA
APPROVED	K.M.RAJAN
SHEET	A4
	01 OF 05





SECTION B-B





SECTION A-A

Sl. No.	Description	Qty.	Material	Size	Remarks
05	DOWEL PIN	01	SILVER STEEL	Ø6x22	XXXXXX
04	DOWEL PIN	01	SILVER STEEL	Ø8x22	XXXXXX
03	CORE PIN	01	EN8	Ø9x16	XXXXXX
02	CAVITY PLATE	01	EN8	60x60x16	XXXXXX
01	CORE PLATE	01	EN8	60x60x16	XXXXXX

DO NOT MEASURE THE DRAWING

IF IN DOUBT ASK POSITIVELY

TOLERANCES UNLESS OTHERWISE SPECIFIED

ANGULAR	X.0	X.00	X.000
±0.30°	±0.25	±0.10	±0.01

ALL DIMENSIONS ARE IN MILIMETRE

REMOVE ALL UNNECESSARY SHARP EDGES

⊥	PERPENDICULARITY(SQUARE)	±0.01
◎	CONCENTRICITY LIMITS	±0.01
//	PARALLELISM	±0.01

SURFACE FINISH AND Ra VALUE IN MICRON

N1 N2 N3	N4 N5 N6	N7 N8 N9	N10 N11	N12
0.025 0.05 0.1	0.2 0.4 0.8	1.6 3.2 4.4	12.5 25	50

CENTRAL TOOL ROOM & TRAINING CENTRE

BHUBANESWAR

B-36, CHANDAKA INDUSTRIAL ESTATE

POST- KIIT, BHUBANESWAR- 751 024

BUTTERFLY MOULD ASSEMBLY

DATE	12.05.2018
DESIGNED	P.C.MOHANTY
CHECKED	S.N.MISHRA
APPROVED	K.M.RAJAN
COMPONENT NO.	XXXXXXXXXXXX
O.C. NO.	XXXXXXXX
SCALE:	NTS
SHEET	A4
	02 OF 05

HAND INJECTION MOULD ASSEMBLY

ROUTE SHEET

JOB DESCRIPTION : **CORE PLATE**
ITEM NO. : 01
QUANTITY : 01

CUSTOMER:
DELEIVERY DATE:
ESTIMATED DATE

OPN. NO.	OPN. CODE	M/C CODE	RESOURCE NAME	START DATE	END DATE	TOTAL TIME	REMARK
1.	MP	SF-1002	POWER HACKSAW				
2.	ML	ML-1001	CONVENTIONAL MILLING				
3.	SG	SG-1002	SURFACE GRINDING				
4.	TG	T&G-1001	TOOL & CUTTER GRINDING				
5.	CML	ML-0703	CNC MILLING (AKSHARA)				
6.	ENG	PML-1101	PENTOGRAPHMILLING (ENGRAVING)				
7.	POL		POLISHING				
8.	ASSY		ASSEMBLY				

JOB DESCRIPTION : **CAVITY PLATE**
ITEM NO. : 01
QUANTITY : 01

CUSTOMER:
DELEIVERY DATE:
ESTIMATED DATE

OPN. NO.	OPN. CODE	M/C CODE	RESOURCE NAME	START DATE	END DATE	TOTAL TIME	REMARK
1.	MP	SF-1002	POWER HACKSAW				
2.	ML	ML-1001	CONVENTIONAL MILLING				
3.	SG	SG-1002	SURFACE GRINDING				
4.	TG	T&G-1001	TOOL & CUTTER GRINDING				
5.	ML	ML-1202	FORM MILLING				
7.	INSP		INSPECTION				
8.	ASSY		ASSEMBLY				

ROUTE SHEET

JOB DESCRIPTION : **CORE PIN**
ITEM NO. : 03
QUANTITY : 01

CUSTOMER:
DELEIVERY DATE:
ESTIMATED DATE

OPN. NO.	OPN. CODE	M/C CODE	RESOURCE NAME	START DATE	END DATE	TOTAL TIME	REMARK
1.	MP	SF-1002	POWER HACKSAW				
2.	TU	TU-1001	CONVENTIONAL TURNING				
3.	INSP		STAGE INSPECTION				

JOB DESCRIPTION : **DOWEL PIN**
ITEM NO. : 04, 05
QUANTITY : 01 EACH

CUSTOMER:
DELEIVERY DATE:
ESTIMATED DATE

OPN. NO.	OPN. CODE	M/C CODE	RESOURCE NAME	START DATE	END DATE	TOTAL TIME	REMARK
1.	MP	SF-1002	POWER HACKSAW				
2.	TU	TU-1001	CONVENTIONAL TURNING				
3.	INSP		STAGE INSPECTION				

JOB DESCRIPTION : **ASSEMBLY & TRY OUT**
ITEM NO. : **HAND INJECTION MOULD**
QUANTITY : 01SET

CUSTOMER:
DELEIVERY DATE:
ESTIMATED DATE

OPN. NO.	OPN. CODE	M/C CODE	RESOURCE NAME	START DATE	END DATE	TOTAL TIME	REMARK
1.	ASSY	FITTING	BENCH VISE				
2.	DRILLING	DR-1001	DRILLING HOLES				
3.	TRYOUT	HAND INJ. MOULD M/C	MOULD TRYOUT				

MANUFACTURING PROCEDURE FOR HAND INJECTION MOULD

ASSEMBLY- Hand Injection Mould Assembly (60 x 60 x 32)

Operations Involved: Assembly drilling for dowel pin, Runner drilling, EDM for Gate cutting & Try Out.

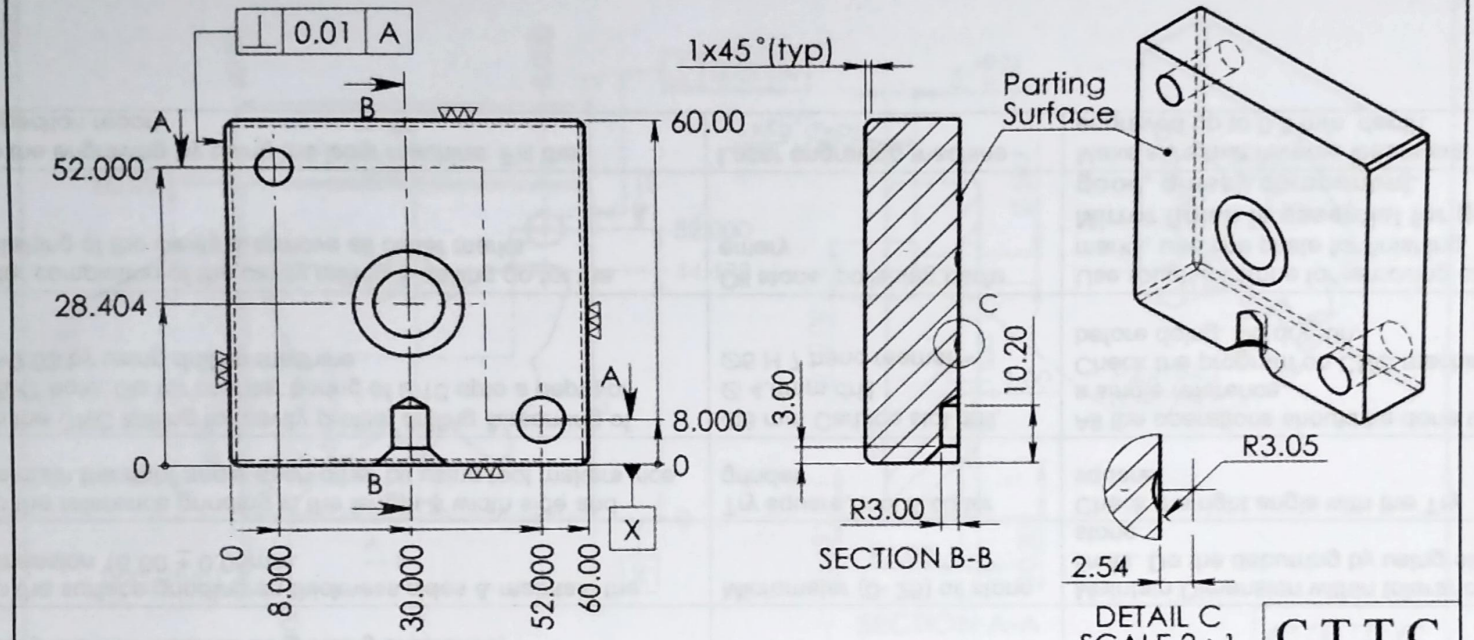
SL.	Operation	Tools Required	Remarks
01	Do the marking for the drilling & Do the centre punching	Height gauge, center punch, 200gm hammer.	Do the marking clearly to get accurate centre.
02	Hold both the plates together matching the reference side of both the plates in one plane and clamp it firmly by using parallel clamp.	Angle plate ,surface table , Tool maker's clamp	Make sure that there is no gap between plates.
03	Do the drilling in two diagonal marked points of drill ∅ 5.8 and ∅ 7.8 mm.	Drill chuck with chuck key. drill ∅ 5.8mm , drill ∅7.8mm	Locate properly the centre of drill bit before drilling. Set the RPM for drilling by using formula $N = \frac{Cs \times 1000}{\pi D}$
04	Do the reaming on both the holes for getting a hole dimension of 6H7 & 8H7	Hand reamer $6H_7$ Hand reamer $8H_7$ tap wrench. Cutting oil,Plug gauges 6H7 & 8H7	Rotate the hand reamer in clock wise direction only even while removing it. Use cutting oil while Reaming. Check the hole by Using plug gauge.
05	Do the fitting of core pin in cavity plate	Hammer, emery	Check the hole & core pin before fitting. Interference must not be more than 0.01mm
06	Grind and match the core pin with the cavity plate in both side.	Surface grinder	Check that pin is exactly matching.
07	Assemble the dowel pins in the cavity plate. Check the smooth opening of two plates.	Hammer, Plug gauges	Check the size of dowel pin & Hole in the cavity Plate.Interference must be within 0.02mm. Maintain slide.fit with core plate.
08	Do the runner hole in one plane of the assembly & then cut the gate in the cavity plate on EDM machine.	Drill ∅ 6 mm, electrode for gate.	Set the spark gap as per the requirement.
09	Do the Chamfering in assembly as per drawing & Do Try Out	8" flat file, Hand injection moulding machine.	Maintain Temperature of plastic and do injection of material. Provide air vent if necessary. Check the component.

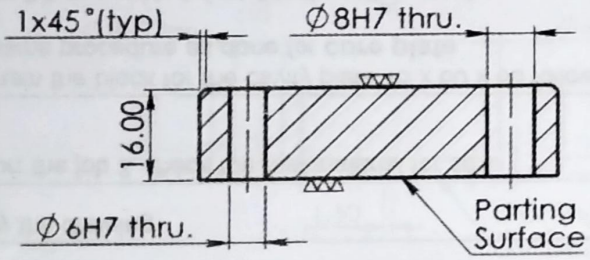
MANUFACTURING PROCEDURE FOR HAND INJECTION MOULD

Part No: CORE PLATE

Operations Involved: Horizontal milling, Vertical Milling, Surface Grinding, Reference Grinding, & CNC Milling.

SL.	Operation	Tools Required	Remarks
01	Study the drawing	Drawing	Study the drawing carefully.
02	Deburr the raw material & check the material for size. (i.e. 65mm x 65mm x 20mm)	12" flat bastard file, vernier caliper 0-150mm.	Ensure that the raw material size is more than the drawing size.
03	Clamp the cutter in the Milling machine spindle with the help of tie rod & Set the job on the machine vice	∅80mm Shell end mill, spanner	Set the RPM with the formula $N=\frac{Cs \times 1000}{\pi D}$
04	Do the Plain milling on any one side of width.	∅80mm Shell end mill, spanner, parallel bar10x35	While fixing the job on the vice ensure that 1st thickness side butt with the fixed jaw of the machine vice.
05	Do the milling on opposite to width side and maintain 60.5 mm and maintain parallelism within 0.05 (.5mm grinding allowance)	∅80mm Shell end mill, spanner, parallel bar10x35, soft hammer	Set the Job on the vice, making sure the 1st width side is properly fixed over the parallel bars.
06	Do The Milling on the 1st thickness side.	∅80mm Shell end mill, spanner, parallel bar10x35	Make Sure that the Job is rigidly fixed in the vice by using parallel bar.
07	Do the plain milling on the opposite thickness side and maintain the dimension 16.5mm and maintain parallelism within 0.05mm. (0.5 mm grinding allowance)	∅80mm Shell end mill, spanner, parallel bar10x35, soft hammer	Fix the job on the parallel bar to get the dimension within the tolerance limit.
08	Set the job on the Machine vice & do the horizontal milling on one length side to make it perpendicular with width & thickness	∅80mm Shell end mill, spanner, parallel bar10x35,	Dial the fixed jaw of the vice with the Machine column & make it perpendicular
09	Reverse the job do milling and just clean the opposite side of the length of the job.	Shell end mill, parallel bar, 6" triangular file	Do the deburring after completion of the job and check for size.
10	Do the marking of the job & then do the hacks awing on the marking line to make the job in to two pieces.	Power hacksaw, steel rule	Take care while cutting to get equal length pieces.
11	Do the deburring of both the job. Hold the two job together and do the V-Milling maintain the last dimension of two block 60.5+0.1. Do the deburring again.	Shell end mill, parallel bar, 6" triangular file	Do the deburring after completion of the job and check for size.
12	Set the thickness side of the job on the magnetic bed & do the surface grinding on the 1st thickness side.	Oil stone, micrometer, surface grinder	Before setting the job deburr all sides of the job.
13	Maintain the thickness 16± 0.05 by grinding the opposite side.	Micrometer 0-25, oil stone	Set the opposite side, only after cleaning the bed properly.
14	Do the reference grinding on the length & width side	Tool & Cutter grinder, Try square	Check the right angle with the help of try square.
15	Set the job on the milling machine Rotary Table & Do the Form milling to a depth 0f 0.5mm as per drawing.	∅6mm ball nose end mill, soft hammer.	Ensure to hold the job properly in the Fixture & set the rotary table properly.
16	Do the Polishing of groove.	Oil Stone, Emery cloth	Get very good smooth surface





SECTION A-A

NOTE:

PROFILE DIMENSION SHOULD BE TAKEN FROM MODEL.

CHAMFER NOT PROVIDED IN PARTING SURFACE.

DOWEL (**ALIGNMNT PIN**) HOLE TO BE MADE IN ASSEMBLY CONDITION.

C.T.T.C. BHUBANESWAR	
DATE	12.05.2018
DESIGNED	P. C. MOHANTY
CHECKED	S. N. MISHRA
APPROVED	RAJAN K. M.
SHEET	A4
	03 OF 05

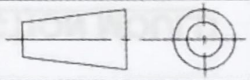
PART NO.	DESCRIPTION	QTY.	SIZE	MATERIAL	REMARKS
01	CORE PLATE	01	60x60x16	EN8	XXXXXXX

O.C. NO: XXXXXXXXXX

JOB. NO : XXXX

IF IN DOUBT ASK POSITIVELY

SCALE : NTS

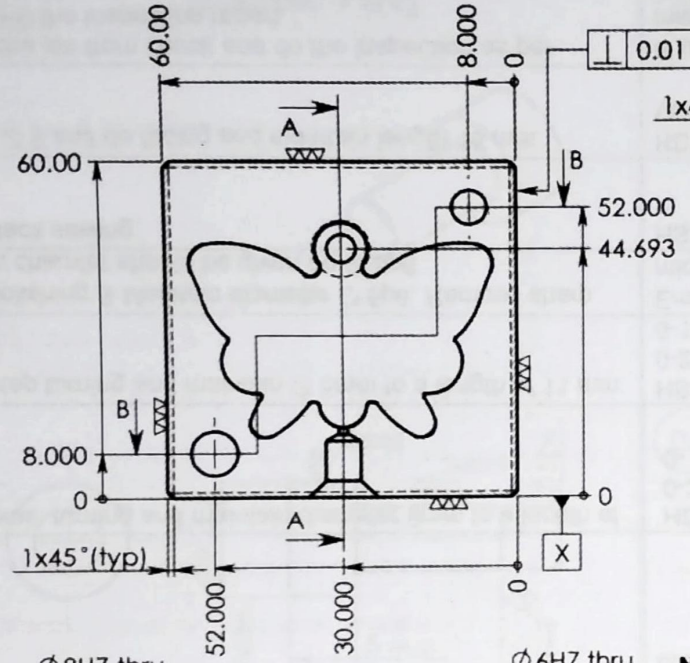


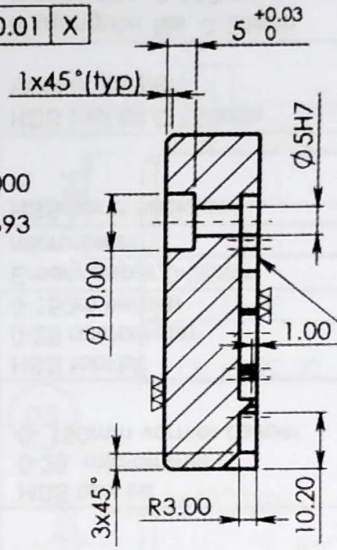
MANUFACTURING PROCEDURE FOR HAND INJECTION MOULD

Part No:2 CAVITY PLATE (16 x 60 x 60)

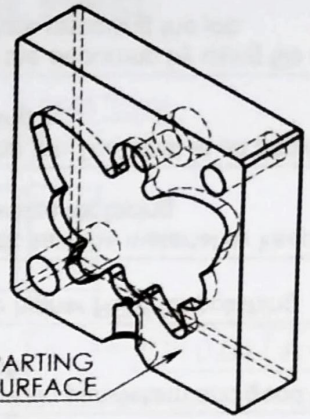
Operations Involved: ***Horizontal milling, Vertical Milling, Surface Grinding, CNC milling, Drilling, Reaming, Engraving & Polishing***

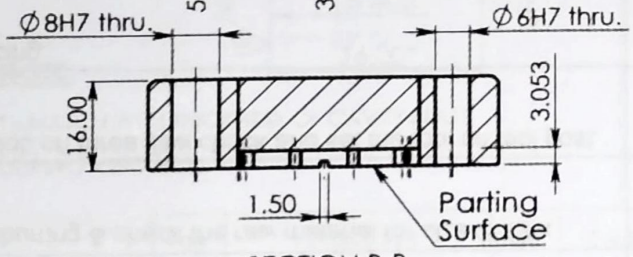
SL.	Operation	Tool Required	Remarks
01	Study the drawing	Drawing	Study the drawing carefully.
02	Deburr the job & check the raw material for size	Vernier Caliper, flat file 12".	The raw material size should be more than the a drawing size given
03	Maintain the block for the cavity plate 16 x 60 x 60 following the same procedure as done for **core plate**. (Keep 0.5 mm material as grinding allowance)	Shell end mill, parallel bar, soft t hammer, spanner, plunger dial with stand	Maintain all the dimensions within tolerance.
04	Do the surface grinding on thickness sides & maintain the dimension 16.00 $\pm$ 0.05mm.	Micrometer (0- 25) oil stone.	Maintain Dimension within tolerance limits. Do the deburring by using oil stone.
05	Do the reference grinding in the length & width side and Maintain the right angle each other by using tool makers vice.	Try square, tool & cutter grinder	Check the right angle with the Try square.
06	Do the CNC Milling for cavity profile, drilling & reaming of ∅5H7 hole. Go for counter boring of ∅10 upto a depth of 5 +0.03 by using drilling machine.	∅6 mm Carbide slot drill, ∅ 4.8mm drill. ∅5 H 7 hand reamer	All the operations should be done taking a single reference. Check the program on CNC machine before doing. Do dry run.
07	After completion of the cavity milling & drilling go for the polishing of the cavity & remove all cutter marks.	Oil stone, polishing paste emery	Use rough iol stone for removing cutter marks, use fine paste for finishing. **Mirror finish is essential for getting good, glossy component.**
08	Do the engraving by using the laser machine. Fill the inspection report.	Laser engraving machine	Make sure that reverse letters are engraved up to 0.3 mm. depth.





SECTION A-A





SECTION B-B

NOTE:

PROFILE DIMENSION SHOULD BE TAKEN FROM MODEL.

CHAMFER NOT PROVIDED IN PARTING SURFACE.

GATE LENGTH = 1MM (MAX.)

DOWEL (**ALIGNMNT PIN**) HOLE TO BE MADE IN ASSEMBLY CONDITION.

C.T.T.C. BHUBANESWAR	
DATE	12.05.2018
DESIGNED	P. C. MOHANTY
CHECKED	S. N. MISHRA
APPROVED	RAJAN K. M.
SHEET	A4
04 OF 05	

PART NO.	DESCRIPTION	QTY.	SIZE	MATERIAL	REMARKS
02	CAVITY PLATE	01	60x60x16	EN8	XXXXXXX

O.C. NO: XXXXXXXXXX

JOB. NO : XXXX

IF IN DOUBT ASK POSITIVELY

SCALE : NTS

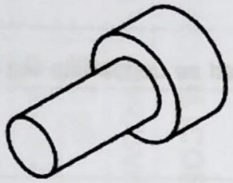
MANUFACTURING PROCEDURE FOR HAND INJECTION MOULD

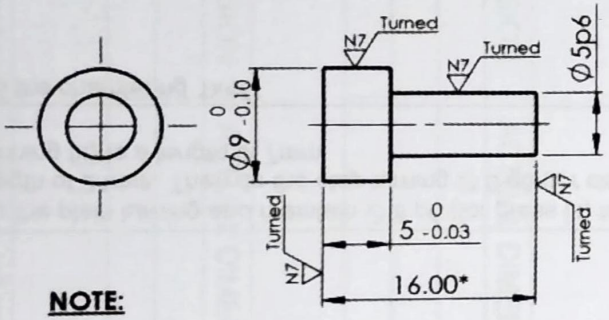
Part No:3 CORE INSERT

Operations Involved: ***Facing, Plain turning, Step Turning and Polishing.***

SL.	Operation	Tool Required	Remarks
01	Study the drawing	Drawing	Study the drawing & Note all tolerances.
02	Do the deburring & check the raw material for size ∅ 12 x 22mm	6' file, 0- 150 mm venire caliper	Raw material size should be more than drawing dimensions.
03	Hold the Job on three Jaw chuck and set the tool on tool post.	8mm Allen key, 30-32 spanner, HSS tool bit	Tool centre height should be set with the centre of tailstock.
04	Do the facing.	30 -32 spanner, HSS tool bit.	Calculate & Set the RPM by using formula $N = \frac{Cs \times 1000}{\pi D}$ keep the tool post at an angle for facing
05	Do the plain turning and maintain diameter 9mm to a length of 18mm.	HSS tool bit 0-25. micrometer 0- 150mm vernier caliper.	Keeps the tool perpendicular for plain turning. Check the diameter by using micrometer.
06	Do the step turning and maintain ∅ 5mm to a length of 11 mm.	HSS tool bit 0-25 micrometer 0-150m vernier	Maintain parallelism and good surface finish.
07	Do the polishing & Maintain diameter ∅ 5p6. Remove sharp edge. No chamfer should be given on ∅ 5p6	Emery paper,0-25mm micrometer	Use higher RPM for polishing.
08	Do the Hack sawing	HSS hand hacksaw	Hack saw the material by keeping oversize for facing.
09	Hold the ∅ 9 and do facing and maintain length 16 mm.	HSS tool bit 0-150mm Vernier caliper.	Keep the Tool post at an angle and do facing.
10	Remove the job from chuck and do the inspection as per drawing. Fill the inspection report.	6' triangular file, 0-25mm micrometer. 0-150mm vernier caliper.	Do the deburring by using file on lathe before removing the job.

03 [CORE PIN]

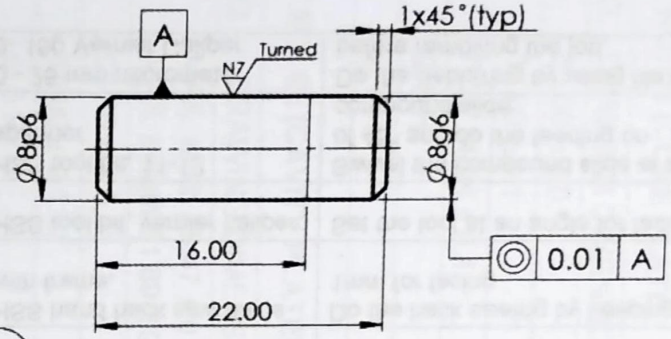




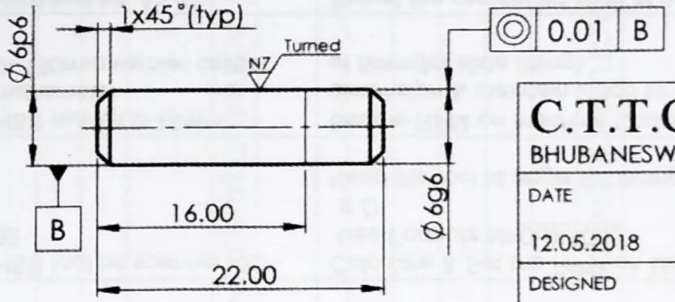
NOTE:

* - MATCH WITH THICKNESS OF CAVITY PLATE DURING ASSEMBLY.

04 [DOWEL PINS]



05



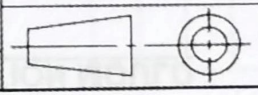
PART NO.	DESCRIPTION	QTY.	SIZE	MATERIAL	REMARKS
05	DOWEL PIN	01	Ø6x22	SILVER STEEL	XXXXXXX
04	DOWEL PIN	01	Ø8x22	SILVER STEEL	XXXXXXX
03	CORE PIN	01	Ø9x16	EN8	XXXXXXX

IF IN DOUBT ASK POSITIVELY

SCALE : NTS

O.C. NO: XXXXXXXXXX

JOB. NO : XXXX



C.T.T.C.
BHUBANESWAR

DATE	12.05.2018
DESIGNED	P. C. MOHANTY
CHECKED	S. N. MISHRA
APPROVED	RAJAN K. M.
SHEET	A4
	05 OF 05

MANUFACTURING PROCEDURE FOR HAND INJECTION MOULD

Part No: 5 DOWEL PIN - ∅ 8p6 x 22

Operations:- ***Facing, Plain turning, Chamfering.***

SL.No	Operation	Tools Required	Remarks
01	Study the drawing	Drawing	
02	Do the deburring & check the raw material for size ∅10 x 30mm	6' triangular file 0- 150 mm Vernier Caliper	
03	Hold the Job in three Jaw chuck and set the tool on tool post	Chuck key ,spanner-30-32 allenkey-8mm, HSS Tool bit	Set the centre height of tool by using tailstock centre.
04	Do the facing	HSS tool bit,spanner -30 - 32	Calculate & Set the RPM on Machine Use Formula N=$\frac{CsX1000}{\pi D}$ Keep the tool at angle for facing.
05	Do the plain turning and maintain ∅ 8 p6 (for press fit) to a length of 24mm. Then do the step turning ∅ 8 g6 (for close running fit) to a length of 7mm	HSS tool bit,0-25mm micrometer 0- 150mm vernier caliper	Set the RPM on machine.Check the dimension & maintain ∅8g6 to a length of 5mm(for slide fitting)
06	Do the chamfering 1x45°.	HSS tool bit, 11-12 spanner.	Swivel the compound slide at an angle of 45^0 & do chamfering by feeding compound slide.
07	Do the hack sawing	HSS hand hack saw blade with frame.	Do the hack sawing by keeping 21mm, 1mm for facing
08	Do the facing and maintain length 22mm	HSS tool bit, vernier caliper	Set the tool at an angle for facing.
09	Do the chamfering	HSS tool bit, 11-12 spanner.	Swivel the compound slide at an angle of 45^0 and do the feeding on compound slide.
10	Remove the job from chuck and do the inspection as per drawing. Fill the inspection report.	0 - 25 mm micrometer 0- 150 Vernier Caliper	Do the deburring by using file on lathe before removing the job.

Part No: 4 Dowel Pin - ∅ 6p6 x 22

Operations:- ***Facing, Plain turning, chamfering***

1.0 Repeat the same procedure as given above.

2.0 Maintain the dimension ∅ 6p6 to a length of 15mm and ∅ 6g6 to a length 7mm.(Please check the Tolerance value from the table)

HAND INJECTION MOULD INSPECTION REPORT

PART NO: 01 (CORE PLATE)

SL. NO.	DRAWING DIMENSION	ACTUAL DIMENSION	DEVIATION
1	60.00 □ ± 0.1		
2	16.00 ± 0.1		
3	PCD 14.94 ± 0.1		
5	Ø 6 H7		
6	Ø 8 H7		

PART NO: 02 (CAVITY PLATE)

SL. NO.	DRAWING DIMENSION	ACTUAL DIMENSION	DEVIATION
1	MAX. width 38.47 ± 0.01 MAX. length 51.89 ± 0.01		
2	60.00 □ ± 0.1		
3	16.00 ± 0.1		
4	Ø 5 H7		
5	Ø 6 H7		
6	Ø 8 H7		

PART NO: 03 (CORE PIN)

SL. NO.	DRAWING DIMENSION	ACTUAL DIMENSION	DEVIATION
1	Ø 5 p6		
2	Ø 9 (+0/-0.1)		
3	5 (+0/-0.03)		

PART NO: 04 (DOWEL PIN)

SL. NO.	DRAWING DIMENSION	ACTUAL DIMENSION	DEVIATION
1	Ø8g6 & Ø8p6		
2	22		

PART NO: 05 (DOWEL PIN)

SL. NO.	DRAWING DIMENSION	ACTUAL DIMENSION	DEVIATION
1	Ø6g6 & Ø6p6		
2	22		

LIMIT DEVIATIONS FOR HOLES
{IS 919 (Part 2) : 1993} {ISO 286-2 : 1988}

Basic Size in mm																		
Above	Upto & including	A11	B11	C11	D10	E9	F8	G7	H7	H8	H9	H11	Js7	K7	N7	P7	R7	S7	T7
---	3	+330 +270	+200 +140	+120 +60	+60 +20	+39 +14	+20 +6	+12 +2	+10 0	+14 0	+25 0	+60 0	+/-5	0 -10	-4 -14	-6 -16	-10 -20	-14 -24	U5-U8
3	6	+345 +270	+215 +140	+145 +70	+78 +30	+50 +20	+28 +10	+16 +4	+12 0	+18 0	+30 0	+75 0	+/-6	+3 -9	-4 -16	-8 -20	-11 -23	-15 -27	U5-U8
6	10	+370 +280	+240 +150	+170 +80	+98 +40	+61 +25	+35 +13	+20 +5	+15 0	+22 0	+36 0	+90 0	+/-7.5	+5 -10	-4 -19	-9 -24	-13 -28	-17 -32	U5-U8
10	18	+400 +290	+290 +150	+205 +95	+120 +50	+75 +32	+43 +16	+24 +6	+18 0	+27 0	+43 0	+110 0	+/-9	+6 -12	-5 -23	-11 -29	-16 -34	-21 -39	U5-U8
18	30	+430 +300	+290 +160	+240 +110	+149 +65	+92 +40	+53 +20	+28 +7	+21 0	+33 0	+52 0	+130 0	+/-10.5	+6 -15	-7 -28	-14 -35	-20 -41	-27 -48	-33 -54
30	40	+470 +310	+330 +170	+280 +120	+180	+112	+64	+34	+25	+39	+62	+160	+/-12.5	+7	-8	-17	-25	-34	-39 -64
40	50	+480 +320	+340 +180	+290 +130	+80	+50	+25	+9	0	0	0	0		-18	-33	-42	-50	-59	-45 -70
50	65	+530 +340	+380 +190	+330 +140	+220	+134	+76	+40	+30	+46	+74	+190	+/-15	+9	-9	-21	-30 -60	-42 -72	-55 -85
65	80	+550 +360	+390 +200	+340 +150	+100	+60	+30	+10	0	0	0	0		-21	-39	-51	-32 -62	-48 -78	-64 -94
80	100	+600 +380	+440 +220	+390 +170	+260	+159	+90	+47	+35	+54	+87	+220	+/-17.5	+10	-10	-24	-38 -73	-58 -93	-78 -113
100	120	+630 +410	+460 +240	+400 +180	+120	+72	+36	+12	0	0	0	0		-25	-45	-59	-41 -76	-66 -101	-91 -126
120	140	+710 +460	+510 +260	+450 +200													-48 -88	-77 -117	-107 -147
140	160	+770 +520	+530 +280	+460 +210	+305 +145	+185 +85	+106 +43	+54 +14	+40 0	+63 0	+100 0	+250 0	+/-20	+12 -28	-12 -52	-28 -68	-50 -90	-85 -125	-119 -159
160	180	+830 +580	+560 +310	+480 +230													-53 -93	-93 -133	-131 -171
180	200	+950 +660	+630 +340	+530 +240													-60 -106	-105 -151	-149 -195
200	225	+1030 +740	+670 +380	+550 +260	+355 +170	+215 +100	+122 +50	+61 +15	+46 0	+72 0	+115 0	+290 0	+/-23	+13 -33	-14 -60	-33 -79	-63 -109	-113 -159	-163 -209
225	250	+1110 +820	+710 +420	+570 +280													-67 -113	-123 -169	-179 -225
250	280	+1240 +920	+800 +480	+620 +300	+400	+240	+137	+69	+52	+81	+130	+320	+/-26	+16	-14	-36	-74 -126	-138 -190	-198 -250
280	315	+1370 +1050	+860 +540	+650 +330	+190	+110	+56	+17	0	0	0	0		-36	-66	-88	-78 -130	-150 -202	-220 -272
315	355	+1560 +1200	+960 +600	+720 +360	+440	+265	+151	+75	+57	+89	+140	+360	+/-28.5	+17	-16	-41	-87 -144	-169 -226	-247 -304
355	400	+1710 1350	+1040 +680	+760 +400	+210	+125	+62	+18	0	0	0	0		-40	-73	-98	-93 -150	-187 -244	-273 -330
400	450	+1900 +1500	+1160 +760	+840 +440	+480	+290	+165	+83	+63	+97	+155	+400	+/-31.5	+18	-17	-45	-103 -166	-209 -272	-307 -370
450	500	+2050 +1650	+1240 +840	+880 +480	+230	+135	+68	+20	0	0	0	0		-45	-80	-108	-109 -172	-229 -292	-337 -400

LIMIT DEVIATIONS FOR SHAFTS
{IS 919 (Part 2) : 1993} {ISO 286-2 : 1988}

Basic Size in mm																			
Above	Upto & including	a11	b11	c11	d9	d10	e8	f7	g6	h6	h7	h9	h11	js6	k6	k7	n6	p6	r6	s6
.....	3	-270	-140	-60	-20	-20	-14	-6	-2	0	0	0	0	+/-3	+6	+10	+10	+12	+16	+20
		-330	-200	-120	-45	-60	-28	-16	-8	-6	-10	-25	-60		0	0	+4	+6	+10	+14
3	6	-270	-140	-70	-30	-30	-20	-10	-4	0	0	0	0	+/-4	+9	+13	+16	+20	+23	+27
		-345	-215	-145	-60	-78	-38	-22	-12	-8	-12	-30	-75		+1	+1	+8	+12	+15	+19
6	10	-280	-150	-80	-40	-40	-25	-13	-5	0	0	0	0	+/-4.5	+10	+16	+19	+24	+28	+32
		-370	-240	-170	-76	-98	-47	-28	-14	-9	-15	-36	-90		+1	+1	+10	+15	+19	+23
10	18	-290	-150	-95	-50	-50	32	-16	-6	0	0	0	0	+/-5.5	+12	+19	+23	+29	+34	+39
		-400	-260	-205	-93	-120	-59	-34	-17	-11	-18	-43	-110		+1	+1	+12	+18	+23	+28
18	30	-300	-160	-110	-65	-65	-40	-20	-7	0	0	0	0	+/-6.5	+15	+23	+28	+35	+41	+48
		-430	-290	-240	-117	-149	-73	-41	-20	-13	-21	-52	-130		+2	+2	+15	+22	+28	+35
30	40	-310	-170	-120																
		-470	-330	-280	-80	-80	-50	-25	-9	0	0	0	0	+/-8	+18	+27	+33	+42	+50	+59
40	50	-320	-180	-130	-142	-180	-89	-50	-25	-16	-25	-62	-160		+2	+2	+17	+26	+34	+43
		-480	-340	-290																
50	65	-340	-190	-140															+60	+72
		-530	-380	-330	-100	-100	-60	-30	-10	0	0	0	0	+/-9.5	+21	+32	+39	+51	+41	+53
65	80	-360	-200	-150	-174	-220	-106	-60	-29	-19	-30	-74	-190		+2	+2	+20	+32	+62	+78
		-550	-390	-340															+43	+59
80	100	-380	-220	-170															+73	+93
		-600	-440	-390	-120	-120	-72	-36	-12	0	0	0	0	+/-11	+25	+38	+45	+59	+51	+71
100	120	-410	-240	-180	-207	-260	-126	-71	-34	-22	-35	-87	-220		+3	+3	+23	+37	+76	+101
		-630	-460	-400															+54	+79
120	140	-460	-260	-200															+88	+117
		-710	-510	-450															+63	+92
140	150	-520	-280	-210	-145	-145	-85	-43	-14	0	0	0	0	+/-12.5	+28	+43	+52	+68	+90	+125
		-770	-530	-460	-245	-305	-148	-83	-39	-25	-40	-100	-250		+3	+3	+27	+43	+65	+100
160	180	-580	-310	-230															+93	+133
		-830	-560	-480															+68	+108
180	200	-660	-340	-240															+106	+151
		-950	-630	-530															+77	+122
200	225	-740	-380	-260	-170	-170	-100	-50	-15	0	0	0	0	+/-14.5	+33	+50	+60	+79	+109	+159
		-1030	-670	-550	-285	-355	-172	-96	-44	-29	-46	-115	-290		+4	+4	+31	+50	+80	+130
225	250	-820	-420	-280															+113	+169
		-1110	-710	-570															+84	+140
250	280	-920	-480	-300															+126	+190
		-1240	-800	-620	-190	-190	-110	-56	-17	0	0	0	0	+/-18	+36	+56	+66	+88	+94	+158
280	315	-1050	-540	-330	-320	-400	-191	-108	-49	-32	-52	-130	-320		+4	+4	+34	+56	+130	+202
		-1370	-860	-650															+98	+170
315	355	-1200	-600	-360															+144	+226
		-1560	-960	-720	-210	-210	-125	-62	-18	0	0	0	0	+/-16	+40	+61	+73	+98	+108	+190
355	400	-1350	-680	-400	-350	-440	-214	-119	-54	-36	-57	-140	-360		+4	+4	+37	+62	+150	+244
		-1710	-1040	-760															+114	+208
400	450	-1500	-760	-440															+166	+272
		-1900	-1160	-840	-230	-230	-135	-68	-20	0	0	0	0	+/-20	+45	+68	+80	+108	+126	+232
450	500	-1650	-840	-480	-385	-480	-232	-131	-60	-40	-63	-155	-400		+5	+5	+40	+68	+172	+292
		-2050	-1240	-880															-132	+252

COMMONLY USED FITS

I. For HOLES

Type of Fit	Class of Shaft	With Holes					Remarks
		H6*	H7	H8	H9	H11	
Clearance	a	***	***	***	***	a11	Large Clearance Fit & widely used
	b	***	***	***	***	b11	Large Clearance Fit & widely used
	c	***	***	***	***	c11	Slack running fit
	d	***	d8*	d8*,d9,d10	d8*,d9,d10	d9	Loose running fit
	e	e7*	e8	e8,e9*	***	***	Easy running fit
	f	f6*	f7	f7, f8*	***	***	Normal Running Fit
	g	g5*	g6	***	***	***	Close running fit or sliding fit. Also spigot & location fit
	h	h5*	h6	h7,h8*,h9	***	h11	Precision sliding fit. Also fine spigot & location fit
Transition	js	js5*	js6	js7*	***	***	Push fit for very accurate location with easy assembly & disassembly.
	k	k5*	k6	k7*	***	***	Light keying fit for keyed shaft, non-running locked pins etc.
	m	m5*	m6*	m7*	***	***	Medium keying fit
	n	n5*	n6	n7*	***	***	Heavy keying fit for tight assembly
Interference	p	p5*	p6	p7*	***	***	Light press fit for non-ferrous parts, Standard press fit for ferrous & non-ferrous parts with easy dismantling
	r	r5*	r6	r7*	***	***	Medium drive fit for ferrous & light drive fit for non-ferrous parts with easy dismantling
	s	s5*	s6	s7*	***	***	Heavy drive fit for ferrous & standard press fit for non-ferrous parts
	t	t5*	t6*	t7*	***	***	Force fit on ferrous part for permanent assembly
	u	***	***	u7*	***	***	Heavy force fit or shrink fit

** Second preference fits*

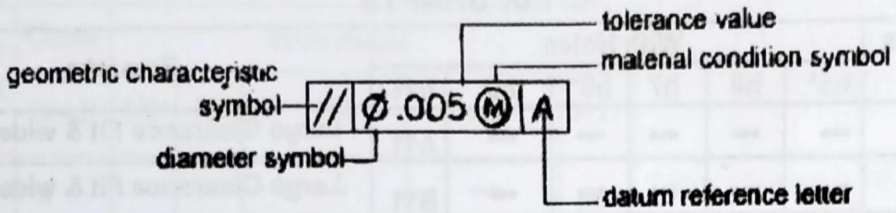
COMMONLY USED FITS

II. For SHAFTS

Type of Fit	Class of	With Holes						Remarks
		h5*	h6	h7	h8*	h9	h11	
Clearance	A	***	***	***	***	***	A11	Large Clearance Fit & widely used
	B	***	***	***	***	***	B11	Large Clearance Fit & widely used
	C	***	***	***	***	***	C11	Slack running fit
	D	***	D9*	***	D10	D10	D11*	Loose running fit
	E		E8*	***	E8*	E9	***	Easy running fit
	F		F7	***	F8	F8*	***	Normal Running Fit
	G	G6*	G7	***	***	***	***	Close running fit or sliding fit. Also spigot & location fit
	H	H6*	H7	H8	H8	H8,H9	H11	Precision sliding fit. Also fine spigot & location fit
Transaction	JS	Js6*	Js7	Js8*	***	***	***	Push fit for very accurate location with easy assembly & disassembly.
	K	K6*	K7	K8*	***	***	***	Light keying fit for keyed shaft, non-running locked pins etc.
	M	M6*	M7*	M8*	***	***	***	Medium keying fit
	N	N6*	N7	N8*	***	***	***	Heavy keying fit for tight assembly
Interference	P	P6*	P7	***	***	***	***	Light press fit for non-ferrous parts, Standard press fit for ferrous & non-ferrous parts with easy dismantling
	R	R6*	R7	***	***	***	***	Medium drive fit for ferrous & light drive fit for non-ferrous parts with easy dismantling
	S	S6*	S7	***	***	***	***	Heavy drive fit for ferrous & standard press fit for non-ferrous parts
	T	T6*	T7	***	***	***	***	Force fit on ferrous part for permanent assembly

** Second preference fits*

Geometrical Tolerance Control Frame



Geometric Characteristic Symbols

Symbol	Characteristic	Type
⌖	Position	Location
◎	Concentricity or coaxiality	Location
⌯	Symmetry	Location
//	Parallelism	Orientation
⊥	Perpendicularity	Orientation
∠	Angularity	Orientation
⌭	Cylindricity	Form
▱	Flatness	Form
○	Circularity or roundness	Form
—	Straightness	Form
⌓	Profile of a surface	Profile
⌒	Profile of a line	Profile
↗	Circular runout	Runout
⌰	Total runout	Runout

Few frequently used symbols

↧ **Depth**

( ) Reference Dimension

⌵ **Counter Sunk**

⌴ **Counter Bore**

Conical Taper

Flat Taper

Ⓛ **Least Material condition**

Ⓜ **Maximum Material condition**

LONG/MEDIUM TERM TRAINING PROGRAMMES SCHEDULE FOR 2022 - 2023

DATE	APRIL	2022
19.04.2022	CCAM	84TH BATCH
20.04.2022	ACCMM	68TH BATCH
DATE	**MAY**	**2022**
10.05.2022	MCC	93RD BATCH
11.05.2022	MCCAPC	41ST BATCH
12.05.2022	ADCHNM	136TH BATCH
13.05.2022	AET	46TH BATCH
17.05.2022	ADSDA	50TH BATCH
18.05.2022	ADCNC	100TH BATCH
20.05.2022	ADMMA	68TH BATCH
24.05.2022	CCNA/SAMSUNG	18TH BATCH/
DATE	**JULY**	**2022**
05.07.2022	PDTDM/PDCC	55TH/33RD BATCH
06.07.2022	PGDTD/CCCT	33RD/11TH BATCH
07.07.2022	MCCAPC/AET	42ND/47TH BATCH
08.07.2022	PDSPM/CCCM	14TH/5TH BATCH
12.07.2022	MCC/MCCAI	94TH/4TH BATCH
13.07.2022	PGAM	13TH BATCH
14.07.2022	PDIM	7TH BATCH
19.07.2022	ADSDA	51ST BATCH
20.07.2022	ADCNC	101ST BATCH
22.07.2022	ACCSA	9TH BATCH
26.07.2022	ADMMA	69TH BATCH
27.07.2022	ADCHNM/SAMSUNG	137TH BATCH/
DATE	**AUGUST**	**2022**
01.08.2022	DTDM/DIM	32ND/11TH BATCH
02.08.2022	ITI MACHINIST	17TH BATCH
03.08.2022	CCCTDM/ACCIQC	30TH/14TH BATCH
04.08.2022	CCTM	36TH BATCH
05.08.2022	ACCWT	15TH BATCH
09.08.2022	PDIAR/MCCM	13TH BATCH
10.08.2022	CCMO	19TH BATCH
16.08.2022	CCAM	85TH BATCH
17.08.2022	ACCMM	69TH BATCH
23.08.2022	MCC	95TH BATCH
24.08.2022	CCNA	19TH BATCH
DATE	**SEPTEMBER**	**2022**
01.09.2022	PDTDM/PDCC	56TH/34TH BATCH
02.09.2022	ACCCM/MCCTD	44TH BATCH
06.09.2022	MCCAPC/AET	43RD/48TH BATCH
07.09.2022	CCERM	8TH BATCH
13.09.2022	ADCHNM/SAMSUNG	138TH/ BATCH
14.09.2022	CCM	6TH BATCH
20.09.2022	ADSDA	52ND BATCH
21.09.2022	ADCNC	102ND BATCH
23.09.2022	ADMMA	70TH BATCH

DATE	OCTOBER	2022
18.10.2022	CCAM	86TH BATCH
19.10.2022	ACCMM	70TH BATCH
25.10.2022	MCCAI	5TH BATCH
26.10.2022	CCNA	20TH BATCH
DATE	**NOVEMBER**	**2022**
01.11.2022	PGDTD/PGAM	34TH/14TH BATCH
02.11.2022	CCTM/ACCIQC	37TH/15TH BATCH
08.11.2022	MCC	96TH BATCH
09.11.2022	ADCHNM/SAMSUNG	139TH/ BATCH
15.11.2022	MCCAPC	44TH BATCH
22.11.2022	ADSDA	53RD BATCH
23.11.2022	ADCNC	103RD BATCH
25.11.2022	ADMMA	71ST BATCH
DATE	**DECEMBER**	**2022**
01.12.2022	CCCT	12TH BATCH
06.12.2022	PDSPM/CCCM	15TH/6TH BATCH
07.12.2022	ACCCM	45TH BATCH
13.12.2022	CCAM	87TH BATCH
14.12.2022	ACCMM	71ST BATCH
20.12.2022	PDIAR	14TH BATCH
21.12.2022	ACCSA/CCNA	10TH/21ST BATCH
DATE	**JANUARY**	**2023**
03.01.2023	*PGDTD	35TH BATCH
04.01.2023	PDTDM	57TH BATCH
06.01.2023	CCM	7TH BATCH
10.01.2023	*MCC	97TH BATCH
11.01.2023	*MCCAPC	45TH BATCH
18.01.2023	*AET	49TH BATCH
19.01.2023	ADCHNM/SAMSUNG	140TH/ BATCH
20.01.2023	ACCIQC	16TH BATCH
24.01.2023	ADSDA	54TH BATCH
25.01.2023	ADCNC	104TH BATCH
DATE	**FEBUARY**	**2023**
01.02.2023	CCTM	38TH BATCH
03.02.2023	ACCWT/CCMO	16TH/20TH BATCH
07.02.2023	ADMMA	73rd BATCH
14.02.2023	CCAM	88TH BATCH
15.02.2022	ACCMM	70TH BATCH
21.02.2023	CCNA	22ND BATCH
DATE	**MARCH**	**2023**
01.03.2023	PDTDM	58TH BATCH
02.03.2023	CCCTDM	31ST BATCH
03.03.2023	ACCCM	46TH BATCH
07.03.2023	MCCAPC/MCCAI	46TH/6TH BATCH
14.03.2023	ADSDA	55TH BATCH
15.03.2023	ADCHNM/SAMSUNG	141ST/ BATCH
21.03.2023	ADCNC	105TH BATCH

**** Special Internship Training for B-Tech final year students.***

CENTRAL TOOL ROOM & TRAINING CENTRE

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